

## REMARKS

Claims 1, 3-5, 7, 8 and 17-21 were pending in the Application prior to the outstanding Office Action. In the Final Office Action mailed November 13, 2006, claims 1, 3-5 and 17-21 were rejected under 35 U.S.C. §103(a) and claims 7 and 8 were objected to.

### **I. RESPONSE TO REJECTIONS UNDER 35 U.S.C. §103(a)**

In paragraph 2 of the Office Action mailed November 13, 2006, the Examiner rejected claims 1, 3, 17, 18, 20 and 21 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,116,848 issued to Thomas et al. ("*Thomas*"), in view of U.S. Patent No. 5,788,453 issued to Donde et al. ("*Donde*"). In paragraph 3 of the Office Action, the Examiner rejected claim 19 under 35 U.S.C. §103(a) as being unpatentable over *Thomas* in view of *Donde*, and further in view of U.S. Patent No. 5,988,971 issued to Fossey et al. ("*Fossey*"). In Paragraph 4 the Examiner rejected claims 4 and 5 under 35 U.S.C. §103(a) as being unpatentable over *Thomas* in view of *Donde*, and further in view of U.S. Patent No. 6,256,555 issued to Bacchi et al. ("*Bacchi*").

#### **A. Independent Claim 1 Patently Distinguishes over *Thomas* in view of *Donde***

Claim 1, in part, recites:

“a workpiece blade for supporting a workpiece;

a first gripper arm operatively mounted to said workpiece blade, said first gripper arm including a first contact pad and first load sensing device for generating electrical signals representing the amount of force said first contact pad is exerting on the workpiece;

a second gripper arm operatively mounted to said workpiece blade, said second gripper arm having a second contact pad and a second load sensing device for generating electrical signals representing the amount of force said second contact pad is exerting on the workpiece;

a motor assembly for moving said first and second gripper arms between a workpiece-loading position and a workpiece-engaging position; and

a processor for receiving said electrical signals from said first load sensing device and said second load sensing device and controlling the drive current supplied to said

motor assembly, enabling said processor to continually adjust the force said first contact pad and said second contact pad exerts on the workpiece.”

*Thomas* does not teach or suggest “enabling said processor to continually adjust the force said first contact pad and said second contact pad exerts on the workpiece.” In contrast, *Thomas* teaches gripping a wafer by spring-loaded active contacts 48, 32. Col. 4, lines 61-64; Col. 4, lines 43-45 and 48-51. *Thomas* does not teach or suggest that the active contacts 48, 32 have any ability to measure the force the contacts 32, 48 are exerting against the wafer. The Examiner, in paragraph 2 of the Office Action, acknowledges that *Thomas* does not teach or suggest that the active contacts 32, 48 have this feature.

*Donde* also does not teach or suggest “enabling said processor to continually adjust the force said first contact pad and said second contact pad exerts on the workpiece.” In contrast, *Donde* teaches using four piezoelectric grippers 106 to detect when the wafer is gripped and, upon initial contact, exerting a predetermined force against the wafer to prevent the wafer from sliding off the end effector. Fig. 13 of *Donde* illustrates the steps for gripping the wafer. First, the computer 112 transmits a constant value for the voltage control signal causing the piezoelectric grippers 106 to bend towards the wafer 102 until they contact the wafer. Col. 9, lines 41-45. When the grippers 106 initially contact the wafer 102, “a digital output signal will be generated to signal to the computer to stop further bending of the piezoelectric gripper.” Col. 9, lines 46-48. Upon confirming that each gripper 106 has contacted the wafer, *Donde* teaches that “the computer will simultaneously increase the voltage control signal to each gripper 106a-d by a predetermined amount.” [emphasis added]. Col. 10, lines 40-44. *Donde* does not teach or suggest that the computer 112 “continually adjust[s] the force” the piezoelectric grippers 106 exerts on the wafer.

*Donde* does teach that “voltages from layers 212 and 218 [of the gripper 106] are sent as feedback voltage signals 310 and 312 .. to an op-amp 314.” Col. 9, lines 18-20. However, as discussed above, these feedback voltage signals 310 and 312 are solely to indicate when a gripper 106 contacts the wafer. The control signals 310 and 312 do not continuously provide feedback to the op-amp 314 so that the computer 112 may control the drive current to a motor assembly and effectively manage the force exerted against the wafer. Therefore, the end effector recited in claim 1 is not obvious over *Thomas* in view of *Donde*.

**B. Dependent Claims 3 and 36-31 Patently Distinguishes over *Thomas* in view of *Donde***

Applicants added new claims 36-41. Dependent claims 3 and 36-41 depend directly or indirectly from independent claim 1. These dependent claims include all of the limitations of the independent claim from which they depend. Applicants respectfully assert that dependent claims 3 and 36-41 are allowable for at least the reasons set forth above concerning independent claim 1.

**C. Independent Claim 17 Patently Distinguishes *Thomas* in view of *Donde***

Claim 17 recites:

“a wafer blade for supporting a wafer;

a first contact arm and a second contact arm each operatively mounted to said wafer blade, said first and second contact arms each having a contact pad adapted to contact a peripheral edge of the wafer;

a motor assembly operatively connected to said first and second contact arms, said motor assembly for moving said first and second contact arms between a wafer-loading position that allows a wafer to be loaded onto said wafer blade and a wafer-engaging position where each said contact pad contacts the peripheral edge of the wafer;

a force sensing device coupled to each one of said contact pads, each force sensing device adapted to generate electrical signals representing the amount of force said contact pad is exerting against the peripheral edge of the workpiece; and

a processor for receiving said electrical signals from each said force sensing device and controlling the drive current supplied to said motor assembly such that said processor maintains said electrical signals received from said force sensing devices at a substantially constant level.”

For at least the same reasons discussed above with regard to claim 1, the apparatus recited in claim 17 is not obvious over *Thomas* in view of *Donde*.

**D. Dependent Claims 18, 20 and 21 Patently Distinguish over *Thomas* in view of *Donde***

Dependent claims 18, 20 and 21 depend directly or indirectly from independent claim 17. These dependent claims include all of the limitations of the independent claim from which they

depend. Applicants respectfully assert that dependent claims 18, 20 and 21 are allowable for at least the reasons set forth above concerning independent claim 17.

**E. Dependent Claim 19 Patently Distinguishes over *Thomas* in view of *Donde* and Further in view of *Fossey***

Claim 19 depends directly from independent claim 17. As discussed above with regard to claim 17, the end effector recited in claim 17 is not obvious over *Thomas* in view of *Donde*. Therefore, claim 19 is not obvious over *Thomas* in view of *Donde*.

*Fossey* does not provide the elements missing in the combination of *Thomas* and *Donde*. *Fossey* teaches that a “top edge gripper 32 is moved downwardly to clamp the wafer in position on the paddle.” Col. 8, lines 27-28. *Fossey* does not teach or suggest a processor for “controlling the drive current supplied to said motor assembly such that said processor maintains said electrical signals received from said force sensing devices at a substantially constant level.” Therefore, the end effector recited in claim 17 is not obvious over *Thomas* in view of *Donde*, and further in view of *Fossey*. Because claim 19 depends directly from independent claim 17, claim 19 is also not obvious over *Thomas* in view of *Donde*, and further in view of *Fossey*.

**F. Dependent Claims 4 and 5 Patently Distinguish over *Thomas* in view of *Donde* and Further in view of *Bacchi***

Claims 4-5 depend directly from independent claim 1. As discussed above with regard to claim 1, the end effector recited in claim 1 is not obvious over *Thomas* in view of *Donde*. Therefore, claims 4-5 are not obvious over *Thomas* in view of *Donde*.

*Bacchi* does not provide the element missing in the combination of *Thomas* and *Donde*. *Bacchi* teaches a vacuum actuated contact 50 that contacts the peripheral edge of the wafer. *Bacchi* does not teach or suggest that the vacuum contact 50 may be “dynamically” adjusted after it is in contact with the wafer. Therefore, the end effector recited in claim 17 is not obvious over *Thomas* in view of *Donde*, and further in view of *Bacchi*. Because claim 19 depends directly from independent claim 17, claim 19 is also not obvious over *Thomas* in view of *Donde*, and further in view of *Bacchi*.

## **II. RESPONSE TO OBJECTION**

In the Office Action, claims 7 and 8 were objected to as being dependent upon a rejected base claim. Applicants have amended claim 7 by incorporating the limitations of claim 1 into claim 7. Applicants respectfully assert that amended claim 7 is therefore in condition for allowance.

### **Additional Remarks**

The references cited by the Examiner but not relied upon have been reviewed, but are not believed to render the claims unpatentable, either singly or in combination.

In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application are allowable, and a Notice of Allowance is requested. Enclosed is a PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. §1.136 for extending the time to respond up to and including today, April 2, 2007

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 50-3548 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

Date: April 2, 2007

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